

SOUTH PENN OIL COMPANY,  
LOCKWOOD WARRANT 2921 LEASE  
Allegheny National Forest  
Oil Heritage ~~Recording Project~~  
Wardwell Field  
Warren Vicinity  
Warren County  
Pennsylvania

HAER No. PA-459

HAER  
PA  
62-WAR,  
4-

PHOTOGRAPHS

XEROGRAPHIC COPIES OF COLOR TRANSPARENCIES

REDUCED COPIES OF MEASURED DRAWINGS

Historic American Engineering Record  
National Park Service  
Department of the Interior  
1849 C Street, NW  
Washington, DC 20240

ADDENDUM TO:  
SOUTH PENN OIL COMPANY, LOCKWOOD WARRANT 2921  
LEASE  
Wardwell Field  
Warren vicinity  
Warren County  
Pennsylvania

HAER PA-439  
*PA,62-WAR,4-*

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD  
National Park Service  
U.S. Department of the Interior  
1849 C Street NW  
Washington, DC 20240-0001

# HISTORIC AMERICAN ENGINEERING RECORD

## ADDENDUM TO SOUTH PENN OIL COMPANY, LOCKWOOD WARRANT 2921 LEASE

HAER No. PA-439

LOCATION: Warren Vicinity, Warren County, Pennsylvania  
UTM: 17.660335.4632783

DATE OF  
CONSTRUCTION: 1909

PRESENT OWNER: Allegheny National Forest

PRESENT USE: Abandoned

SIGNIFICANCE: Pennsylvania is the birthplace of the petroleum industry, signified by the drilling of Edwin Drake's well near Titusville in 1859. Many widely used techniques of drilling and pumping oil were first developed here in the effort to recover the high-quality "Pennsylvania Grade" oil. One particularly important, and successful, technique perfected in Pennsylvania was "central power" pumping of numerous low-production wells to economically recover small amounts of oil. This method of production flourished between ca. 1890 and ca. 1950, and today there are only scattered remains of this once common pumping technique. The South Penn Oil Company, Lockwood Warrant 2921 Lease is an excellent, rare, intact example of the mature, highly capitalized era of central powers. Furthermore, its octagon-shaped powerhouse is a refinement unique to northwestern Pennsylvania.

HISTORIAN: Michael W. Caplinger, 1997

PROJECT  
INFORMATION: The Allegheny National Forest Oil Heritage Recording Project was undertaken during the summer of 1997 by the Historic American Engineering Record (HAER, Eric DeLony, Chief), a long-range program to document historically significant engineering, industrial and maritime works in the United States. The program is part of the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) Division of the National Park Service, U.S. Department of the Interior. This project was sponsored by cooperative agreements between HABS/HAER, E. Blaine Cliver, Chief; the West Virginia University Institute for the History of Technology and Industrial Archaeology (IHTIA), Dr. Emory Kemp, Director; and Allegheny National Forest

(ANF), a unit of the Eastern Region of the U.S. Department of Agriculture (USDA) Forest Service, John Palmer, Supervisor. The Southwestern Pennsylvania Heritage Preservation Commission, Randy Cooley, Director, provided major funding.

The field work, measured drawings, historical reports and photographs were prepared under the general direction of Christopher Marston, HAER Project Leader, with consultation from Phil Ross, ANF Historian. The field team was led by Eric Elmer, HAER Field Architect Supervisor and Michael Caplinger, IHTIA Historian. The team included Arturs Lapins, US/ICOMOS Intern (Latvia); and IHITA delineators Paul Boxley, Scott Daley, Kara Hurst, and Kevin McClung. John T. Nicely produced the large format photography.

See also HAER No. PA-436, "Allegheny National Forest Oil Heritage," which provides a brief overview of the history of oil production in Pennsylvania and the history and operation of central power well-pumping systems.

## INTRODUCTION

While petroleum sometimes would flow from a well under its own pressure, this was not usually the case. Most successful oil wells in Appalachia followed a pattern of high initial production (sometimes hundreds of barrels per day per well) followed by a rapid drop off to a few barrels per day--or week--or nothing at all. Thereafter, the well had to be mechanically pumped to recover any oil. By the 1870s, the "standard" pumping outfit was in use in Pennsylvania. Much of the surface equipment used to drill a well (the engine, bandwheel, and walking beam) could also be used to pump it. This was a one-engine-one-well system in which a steam-powered engine pumped a single well, termed "pumping on the beam."

After a well aged and production leveled off, it required pumping for only a short period, perhaps once or a few times a week.<sup>1</sup> In the decade following the establishment of Drake's well, there was little impetus for pumping low-production wells after their initial outflow, since new fields were continually being discovered and the drillers could simply move on to sink another well. There were exceptions, however, such as when the oil tapped by a well was of extremely high quality. With oil prices extremely low, though, it cost too much to outfit, maintain and equip an installation at each well. As prices began to stabilize in the 1880s, pumping became more feasible, and economization of the process became the key to profitability. This drive for efficiency resulted in the popularization of centrally powered multiple-well pumping systems, which were perfected in Pennsylvania's oil fields.

The essential components of a central power system were: the prime mover, or engine; a power reduction/motion-conversion/power distribution unit (always called the "power" in oil-field parlance, not to be confused with the engine or prime mover), which converted the engine's rotary motion to horizontal reciprocating motion; the shackle lines (also called pull, jerker or rod lines), which transmitted the reciprocating motion from the power out to the pump jacks; the pump jacks, which converted the horizontal reciprocating motion of the rod lines to vertical reciprocating motion; and finally, the sucker rods, which operated valves at the bottom of the well that pumped the oil to the surface. The engine and power required a substantial concrete foundation to resist the immense strains put on the machinery, and both were enclosed in a protective powerhouse. Powerhouses not only lessened the chance for fires, but also held spare parts and tools and gave the pumper and machinery protection from the elements. These equipment configurations were generally called central powers, but the term "jack plant" was also common. With the advent of gas and oil powered engines in the mid 1890s, costs were further lowered since the engine was powered by gas produced from the very wells it was pumping--a sort of low-cost perpetual pumping machine that required little manpower or maintenance to keep in operation. By about 1900, numerous oil-well supply companies had developed standardized systems that could be purchased in part or whole.

Certain factors controlled the use of central powers. Wells had to be relatively shallow, less than 3,000'. While up to forty shallow wells could theoretically be pumped by a well-balanced high-powered system, fifteen to twenty was a more common number. The wells had to be in relatively close proximity, within a mile. Although the shackle lines could be routed over and

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<sup>1</sup> To increase production, a well could be "shot" or "torpedoed" with nitroglycerin to extensively fracture the oil sands at the bottom of the hole.

around difficult terrain, extreme topography could hinder their use and was sometimes better suited to individual wells pumping “on the beam.” While central power systems flourished between ca. 1880 and ca. 1950, the “unit pumper,” a self-contained pumping machine powered by a small gasoline engine or electric motor, succeeded them.

## **GEOLOGY**

South Penn Oil Company built the Lockwood lease pumping plant in 1909 and operated it until around 1960. This site is located on the Wardwell oil field, which was discovered in 1875, and produced from the Clarendon Stray sand and the Glade sand.<sup>2</sup> Here, the Glade sand lies between 1,000’ and 1,200’, and the Clarendon Stray sand is slightly deeper. Each well probably produced an average of less than one barrel of petroleum per day.

## **MACHINERY AND THE POWERHOUSE**

The prime mover is a 30-horsepower Olin engine with double flywheels and (probably) a hot-tube ignition (it is missing one flywheel, the clutch mechanism, and the cylinder). Gas from a nearby well-head, which passed through a gasometer (located in the phone booth-sized gasometer house located just to the south of the building) to stabilize the pressure prior to being sent into the powerhouse, fired the engine. While the engine ran, a thermal siphon system that circulated water from a coolant-water reservoir through the engine’s cylinder jacket cooled the engine. It is mounted on a concrete foundation with “SP Co” (an abbreviation of South Penn Oil Company) cast into the west end. A 16”-wide leather belt transferred the engine’s rotary motion to a geared power.

The power is an Acme Company crank-and-disc geared unit mounted on a concrete pedestal. The power reduced the engine’s r.p.m. and imparted an 18” stroke to the rod lines. Two sets of wooden steps lead to the top of the unit so it could be easily oiled or adjusted. This power’s single disc allowed all the rod lines to enter the powerhouse at the same level, and a horizontal slot is incorporated along the octagon’s walls for the rod lines. Evidence on the octagon’s concrete floor indicates the power and its octagon may have been rebuilt at the same time. The Titusville Iron Company of Pennsylvania manufactured both the Olin engine and Acme power. The shackle lines are 1”-diameter steel rods, supported by steel pipe tripods with pendulum hangers. There are three wooden hook-off posts, mounted on small concrete foundations, just outside the power. No pump jacks could be located.

The structure housed a number of auxiliary components. The beltway between the engine and geared power has two long 12”-diameter pipes mounted on the floor that were drip-gas condensers. There is also a small concrete pedestal, which was the base for a small air-compressor used to charge a compressed air reservoir (both are missing). When the engine was restarted, this reservoir of air was injected into the cylinder to crank-over the flywheels. A steel coolant water tank sits just outside the building. A small phone booth sized gasometer house that

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<sup>2</sup> This was originally called the Wardwell Field, discovered in 1875. Today, the site is in the northeast section of the main Clarendon Field in the Clarendon Pool, although it borders directly on the (east) Warren Field.

held the gas regulator controlling the outflow of gas into the engine is located near the west end of the building.

Visually and structurally, the powerhouse is divided into three parts. The western portion of the powerhouse is a rectangular engine room consisting of a simple wood-frame structure with a corrugated tin sheet exterior and roof. Flat tin sheeting finishes the engine room's interior ceiling and four walls, and the space is sectioned-off from the remainder of the building to reduce the chance of accidental fire. A small gas stove and a gas light fixture provided heat and light. Two small windows in either wall also provide light and ventilation, in the summer months. Doors pierce both the western and eastern walls--the western door leads outside beneath a simple overhanging porch roof, while the eastern door leads to the beltway or "belt tunnel." The date "1909" (probably signifying the construction date) is painted on one of the tin sheet walls.

The belt tunnel is an elongated passage with wood framing, corrugated tin sheet walls and roof, and a concrete floor connecting the engine room to the octagon power room. One small window in either wall provides light. The belt passes along the northern side of the passage, and the southern side is a walkway.

The octagon-shaped structures housing the Lockwood power and Mead power (see HAER No. PA-438) are a regional variant of the standard rectangular powerhouses found in other oil fields. The Lockwood power octagon is a wood-frame structure with corrugated tin sheet exterior and a conical, wood-shingle roof created by eight identical triangles. As in the rest of the structure, the floor is concrete. Inside the wood framing is left exposed. Heavier horizontal cross beams incorporated into the walls at the height of the rod lines, just below the horizontal slot that circles the room, helped resist the strains of the oscillating rods as they rubbed on the framing. Extra-heavy hewn timbers are used for the eight primary vertical members. Two small rectangular doors pierce the octagons walls, as do three small windows.

Octagons were built in this part of Pennsylvania from around 1905 to around 1920, perhaps solely by the South Penn Company, and represent the highest aesthetic development of otherwise strictly utilitarian powerhouses. They were probably structurally superior as well, as the triangular frame layout appears inherently stronger, while providing for more floor space around the power than a rectangular building. Importantly, an octagon's low, conical roof efficiently shed both wind and snow coming from any direction, fighting the extreme weather conditions often found in northwestern Pennsylvania. The Lockwood power's location on a north-facing hillside was a logical location for such a specialized structure. The octagon's powers examined during this project's fieldwork are nearly identical, but each differs slightly in the framing layout, interior configuration and machinery. Local contractors specializing in pumping plant construction obtained construction materials locally and erected the buildings. The machinery was put in place first, and then the building was erected around it.

One or two men who started the engine and pumped the wells two or three times a week probably maintained and operated this jack plant. A single pumping cycle usually lasted less than two hours. Each well likely produced less than three barrels of oil per week.

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